

CLAIMS

I/We claim:

- [c1] 1. A packaged microelectronic device, comprising:
an image sensor die having a first side with a bond-pad, an active area on
the first side, and a second side opposite the first side;
a radiation transmissive window positioned over the active area; and
a lead mounted to the second side of the image sensor die and electrically
coupled to the bond-pad.
- [c2] 2. The device of claim 1, further comprising a casing over the bond-
pad, at least a portion of the second side of the image sensor die, and at least a
portion of the lead.
- [c3] 3. The device of claim 1, further comprising a casing over the bond-
pad, at least a portion of the second side of the image sensor die, and a portion of
the lead; and
wherein the lead includes an end external to the casing.
- [c4] 4. The device of claim 1, further comprising:
a casing over the bond-pad, at least a portion of the second side of the
image sensor die, and at least a portion of the lead; and
a solder ball electrically coupled to the lead.
- [c5] 5. The device of claim 1, further comprising a casing over at least a
portion of the second side of the image sensor die;
wherein the lead includes a first end and a second end opposite the first
end;
wherein the first and second ends are covered by the casing; and

wherein a portion of the lead between the first and second ends is exposed to an ambient environment.

[c6] 6. The device of claim 1 wherein the lead is coupled to the second side of the image sensor die by a lead-on-chip tape.

[c7] 7. The device of claim 1, further comprising a casing over at least a portion of the second side of the image sensor die;
wherein the lead includes a first portion attached to the second side of the image sensor die and a second portion at least proximate to the first portion;
wherein the casing has a recess exposing the second portion of the lead to an ambient environment; and
wherein the recess defines an axis that intersects the window and the image sensor die.

[c8] 8. The device of claim 1, further comprising a casing over at least a portion of the second side of the image sensor die and a portion of the lead;
wherein the lead includes a first portion attached to the image sensor die and a second portion spaced apart from the first portion; and
wherein the casing includes a recess exposing the second portion of the lead for attachment to a substrate.

[c9] 9. The device of claim 1 wherein:
the window includes a first side and a second side attached to the image sensor die and opposite the first side; and
the device further comprises a removable protective covering over at least a portion of the first side of the window.

[c10] 10. The device of claim 1 wherein the window is attached to the image sensor die with an adhesive.

[c11] 11. A packaged microelectronic device, comprising:
an image sensor die having a first side with an active area, a plurality of bond-pads on the first side, and a second side opposite the first side;
a radiation transmissive member juxtaposed to the first side of the image sensor die;
a plurality of leads carried by the second side of the image sensor die and electrically coupled to corresponding bond-pads; and
a casing covering the bond-pads, at least a portion of the second side of the image sensor die, and at least a portion of the lead.

[c12] 12. The device of claim 11 wherein the leads include an end external to the casing.

[c13] 13. The device of claim 11, further comprising:
a plurality of ball-pads on corresponding leads; and
a plurality of solder balls on corresponding ball-pads;
wherein the leads are not exposed to an ambient environment.

[c14] 14. The device of claim 11 wherein:
the leads include a first end and a second end opposite the first end;
the first and second ends are covered by the casing; and
a portion of the leads between the first and second ends are exposed to an ambient environment.

[c15] 15. The device of claim 11 wherein the leads are attached to the second side of the image sensor die by a lead-on-chip tape.

- [c16] 16. The device of claim 11 wherein:
the leads include a first portion attached to the second side of the image sensor die and a second portion at least proximate to the first portion;
the casing has a plurality of recesses exposing the second portion of the leads; and
the recesses define a plurality of axes that intersect the window and the image sensor die.
- [c17] 17. The device of claim 11 wherein:
the leads include a first portion attached to the image sensor die and a second portion spaced apart from the first portion; and
the casing includes a plurality of recesses exposing the second portion of the leads for attachment to a substrate.
- [c18] 18. The device of claim 11 wherein:
the window includes a first side and a second side opposite the first side, the second side being attached to the image sensor die; and
the device further comprises a removable protective covering over at least a portion of the first side of the window.
- [c19] 19. The device of claim 11 wherein the leads include a portion external to the casing, the portion having an arcuate configuration.
- [c20] 20. The device of claim 11 wherein the leads include a portion external to the casing, the portion having an "L" shaped configuration.
- [c21] 21. A packaged microelectronic device, comprising:
an image sensor die having a first side with a bond-pad, an active area, and a second side opposite the first side;

a window at the first side of the image sensor die;
a lead mounted to the second side of the image sensor die and electrically coupled to the bond-pad, the lead having a first end and a second end opposite the first end; and
a casing over the bond-pad and at least a portion of the second side of the image sensor die, wherein at least a portion of the second end of the lead is exposed through the casing.

[c22] 22. The device of claim 21 wherein:
the lead further includes a first portion attached to the second side of the image sensor die and a second portion at least proximate to the first portion;
the casing has a recess exposing the second portion of the lead; and
the recess defines an axis that intersects the window and the image sensor die.

[c23] 23. The device of claim 21 wherein the lead is attached to the second side of the image sensor die by a lead-on-chip tape.

[c24] 24. The device of claim 21 wherein:
the window includes a first side and a second side opposite the first side, the second side being attached to the image sensor die; and
the device further comprises a removable protective covering over at least a portion of the first side of the window.

[c25] 25. The device of claim 21 wherein the second end of the lead has an arcuate configuration.

[c26] 26. The device of claim 21, wherein the second end of the lead has an "L" shaped configuration.

- [c27] 27. A method for packaging a microelectronic device including an image sensor die having a first side with a bond-pad, an active area, and a second side opposite the first side, the method comprising:
- attaching a radiation transmissive window to the first side of the image sensor die;
 - mounting a lead to the second side of the image sensor die;
 - electrically coupling the bond-pad to the lead; and
 - encapsulating at least a portion of the lead and at least a portion of the second side of the image sensor die with a casing.
- [c28] 28. The method of claim 27, further comprising attaching a removable protective covering over at least a portion of the window.
- [c29] 29. The method of claim 27 wherein the lead includes an end, and wherein encapsulating at least a portion of the lead comprises covering the portion of the lead with the casing without covering the end of the lead.
- [c30] 30. The method of claim 27, further comprising:
- forming a ball-pad on the lead; and
 - placing a solder ball on the ball-pad.
- [c31] 31. The method of claim 27 wherein the lead includes a first end and a second end opposite the first end, and wherein encapsulating at least a portion of the lead comprises covering the first and second ends of the lead with the casing without covering a portion of the lead between the first and second ends.
- [c32] 32. The method of claim 27 wherein:
- the lead includes a first portion and a second portion at least proximate to the first portion, the first portion being attached to the second side of the image sensor die; and

encapsulating at least a portion of the lead comprises covering the portion of the lead with the casing without covering the second portion of the lead.

[c33] 33. The method of claim 27 wherein coupling the lead to the image sensor die comprises attaching the lead to the image sensor die with a lead-on-chip tape.

[c34] 34. A method for packaging a microelectronic device, comprising:
positioning a window at an active area of a first side of an image sensor die;
mounting a lead to a second side of the image sensor die opposite the first side;
electrically coupling a bond-pad on the first side of the image sensor die to the lead;
disposing the window, the image sensor die, and the lead in a mold cavity;
and
injecting a mold compound into the mold cavity to encapsulate at least a portion of the image sensor die.

[c35] 35. The method of claim 34 wherein disposing the window, the image sensor die, and the lead in the mold cavity comprises applying a force to the lead to press the window against a wall of the mold cavity.

[c36] 36. The method of claim 34, further comprising:
removing the window, the image sensor, and the lead from the mold cavity as a unit;
forming a ball-pad on the lead; and
placing a solder ball on the ball-pad.

[c37] 37. The method of claim 34, further comprising attaching a removable protective covering over the window before disposing the window in the mold cavity.